

# Claims

- [c1] A pedal force sensing apparatus for an electric bicycle, comprising:
- a pedal force input shaft whose center line is designated as an axial direction;
  - a torque output shaft mounted around the pedal force input shaft and including at least one leading groove;
  - a force action sleeve mounted around and fixed on the pedal force input shaft and including at least one first guiding pin;
  - at least one elastomer whose two ends separately contact the force action sleeve and torque output shaft for transferring torque from the force action sleeve to the torque output shaft, wherein an elastic deformation is formed by a relative angular displacement between the torque output shaft and the force action sleeve;
  - a diversion sleeve including at least one spiral slot and at least one second guiding pin, wherein a relative axial direction displacement and a relative angular displacement exist between the spiral slot and first guiding pin, and a relative axial direction displacement exists between the leading groove and the second guiding pin;
  - a linear sliding bush mounted on the pedal force input

shaft and sliding along the axial direction in synchronous relation with the diversion sleeve; and a displacement sensor for sensing the axial direction displacement of the linear sliding bush.

- [c2] The pedal force sensing apparatus for an electric bicycle of Claim 1, wherein no relative axial direction displacement exists between the pedal force input shaft and torque output shaft, and no angular displacement exists between the pedal force input shaft and linear sliding bush.
- [c3] The pedal force sensing apparatus for an electric bicycle of Claim 1, further comprising a mechanism housing for acting as a cover for the pedal force sensing apparatus.
- [c4] The pedal force sensing apparatus for an electric bicycle of Claim 3, wherein the displacement sensor is placed in a long slot on the mechanism housing.
- [c5] The pedal force sensing apparatus for an electric bicycle of Claim 1, wherein the linear sliding bush includes a displacement flag standing on the surface of the linear sliding bush.
- [c6] The pedal force sensing apparatus for an electric bicycle of Claim 5, wherein the displacement flag has an axial displacement.

- [c7] 7.The pedal force sensing apparatus for an electric bicycle of Claim 1, wherein the torque output shaft includes at least one gripping tooth and an output end.
- [c8] The pedal force sensing apparatus for an electric bicycle of Claim 7, wherein the gripping tooth is engaged with the force action sleeve through the elastomer.
- [c9] The pedal force sensing apparatus for an electric bicycle of Claim 7, wherein an output shaft sleeve is mounted around the output end and combined with a chain wheel.
- [c10] The pedal force sensing apparatus for an electric bicycle of Claim 1, wherein the elastomer is a spring.
- [c11] The pedal force sensing apparatus for an electric bicycle of Claim 1, wherein the displacement sensor is a linear displacement meter.
- [c12] The pedal force sensing apparatus for an electric bicycle of Claim 3, further comprising a casing enclosing the mechanism housing for fixing the pedal force sensing apparatus on the electric bicycle.
- [c13] The pedal force sensing apparatus for an electric bicycle of Claim 1, wherein an end of the pedal force input shaft is combined with a crank included in the electric bicycle.